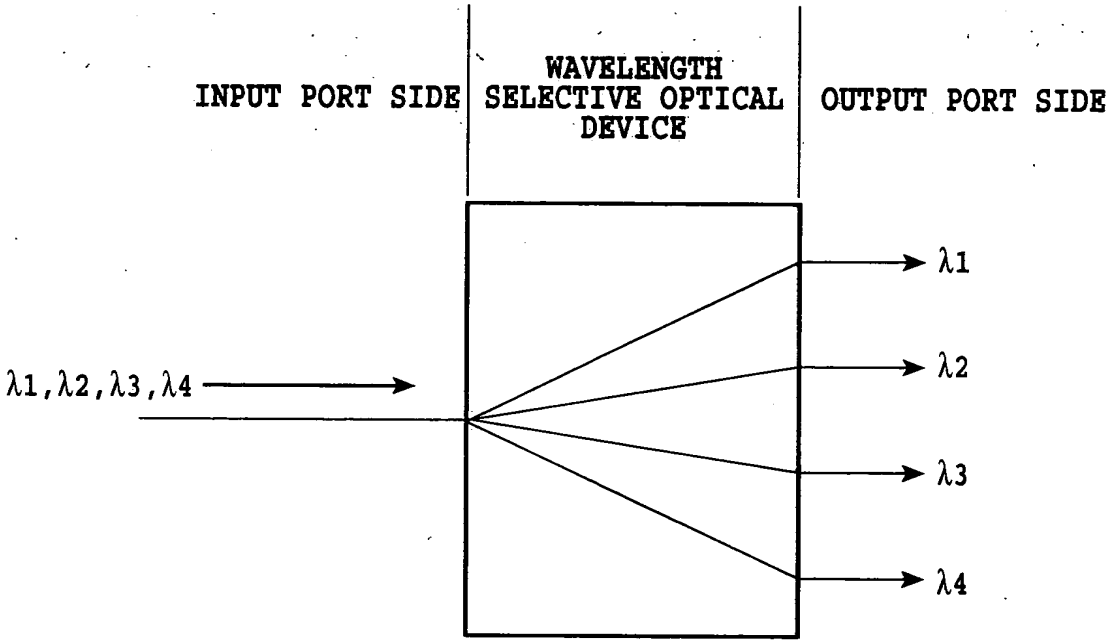

FIG.1
PRIOR ART

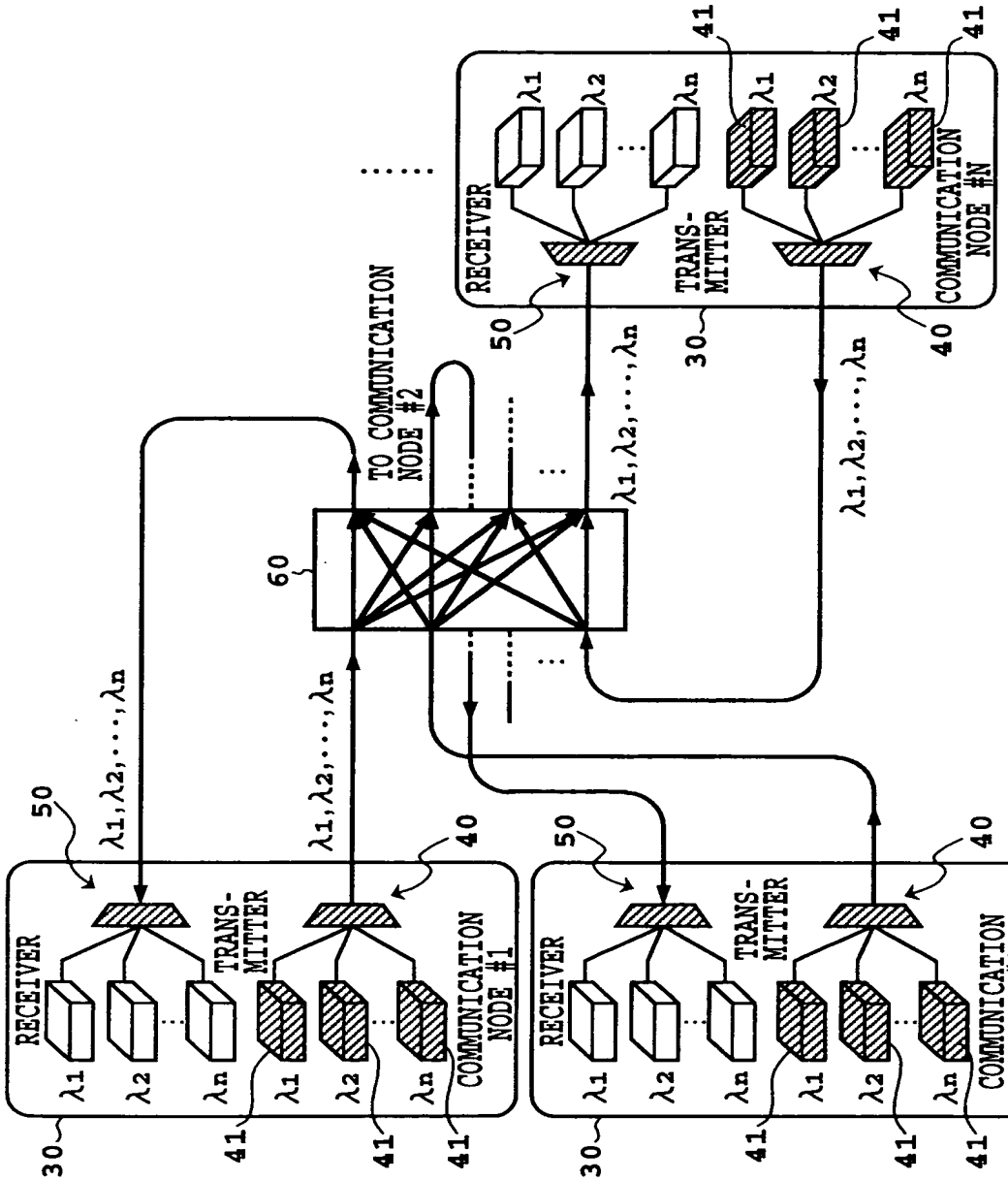

FIG.2
PRIOR ART

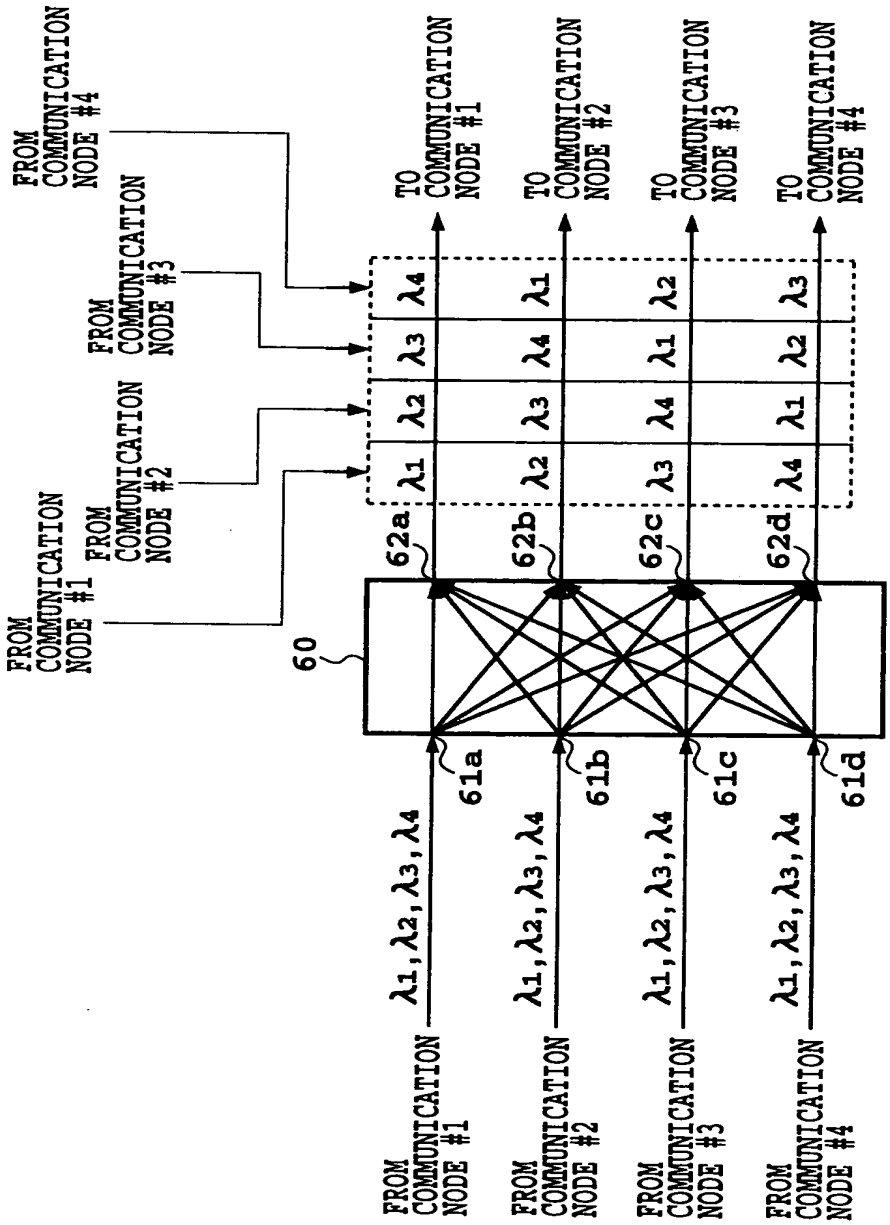

FIG.3
PRIOR ART

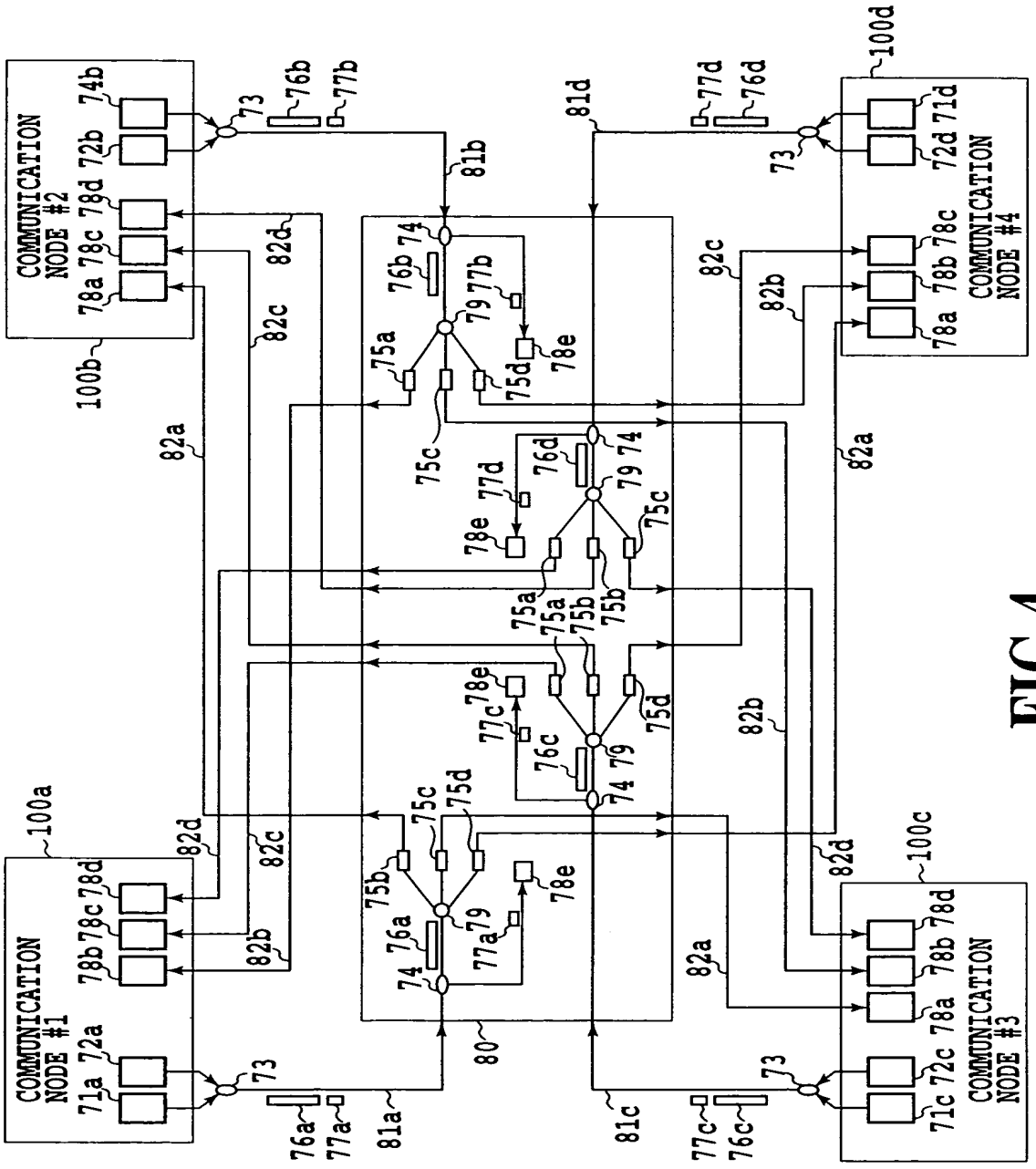

FIG.4
PRIOR ART

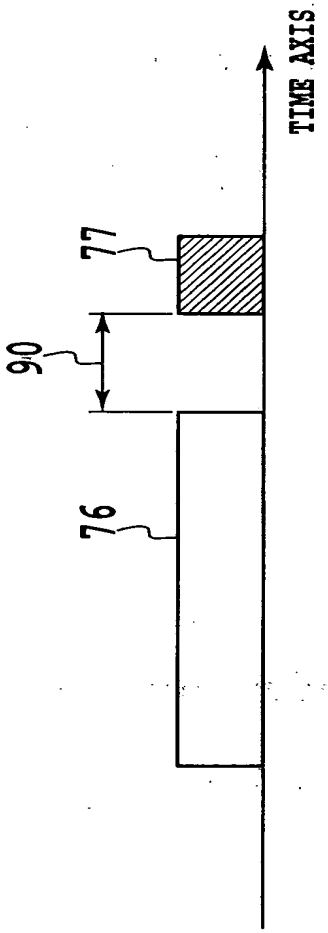

FIG.5
PRIOR ART

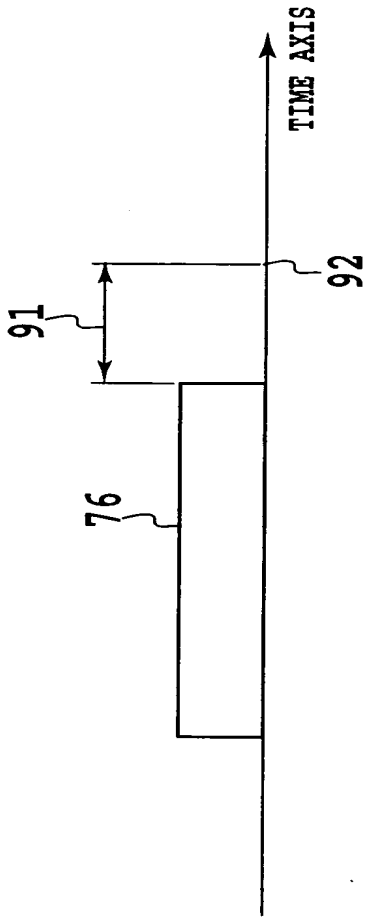

FIG.6
PRIOR ART

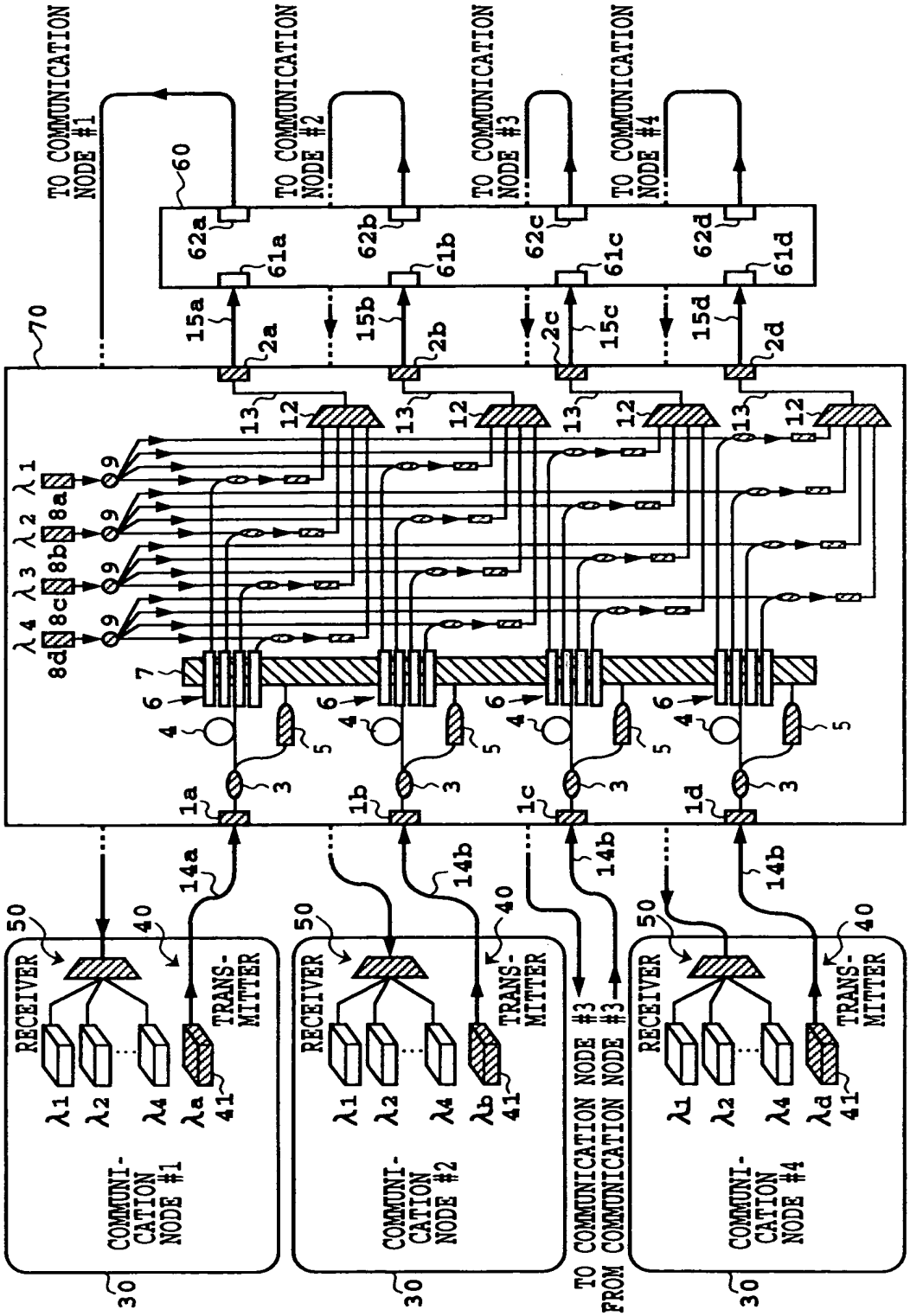
TO COMMUNICATION NODE #1
TO COMMUNICATION NODE #2
TO COMMUNICATION NODE #3
TO COMMUNICATION NODE #4
60
62a
62b
62c
62d
61a
61b
61c
61d
70
15a
15b
15c
15d
2a
2b
2c
2d
13
12
λ1
λ2
λ3
λ4
8a
8b
8c
8d
9
7
6
4
5
3
1a
1b
1c
1d
14a
14b
50
40
RECEIVER
TRANS-MITTER
λ1
λ2
λ4
λa
λb
41
COMMUNI-CATION NODE #1
COMMUNI-CATION NODE #2
COMMUNI-CATION NODE #4
30
TO COMMUNICATION NODE #3
FROM COMMUNICATION NODE #3

FIG.7

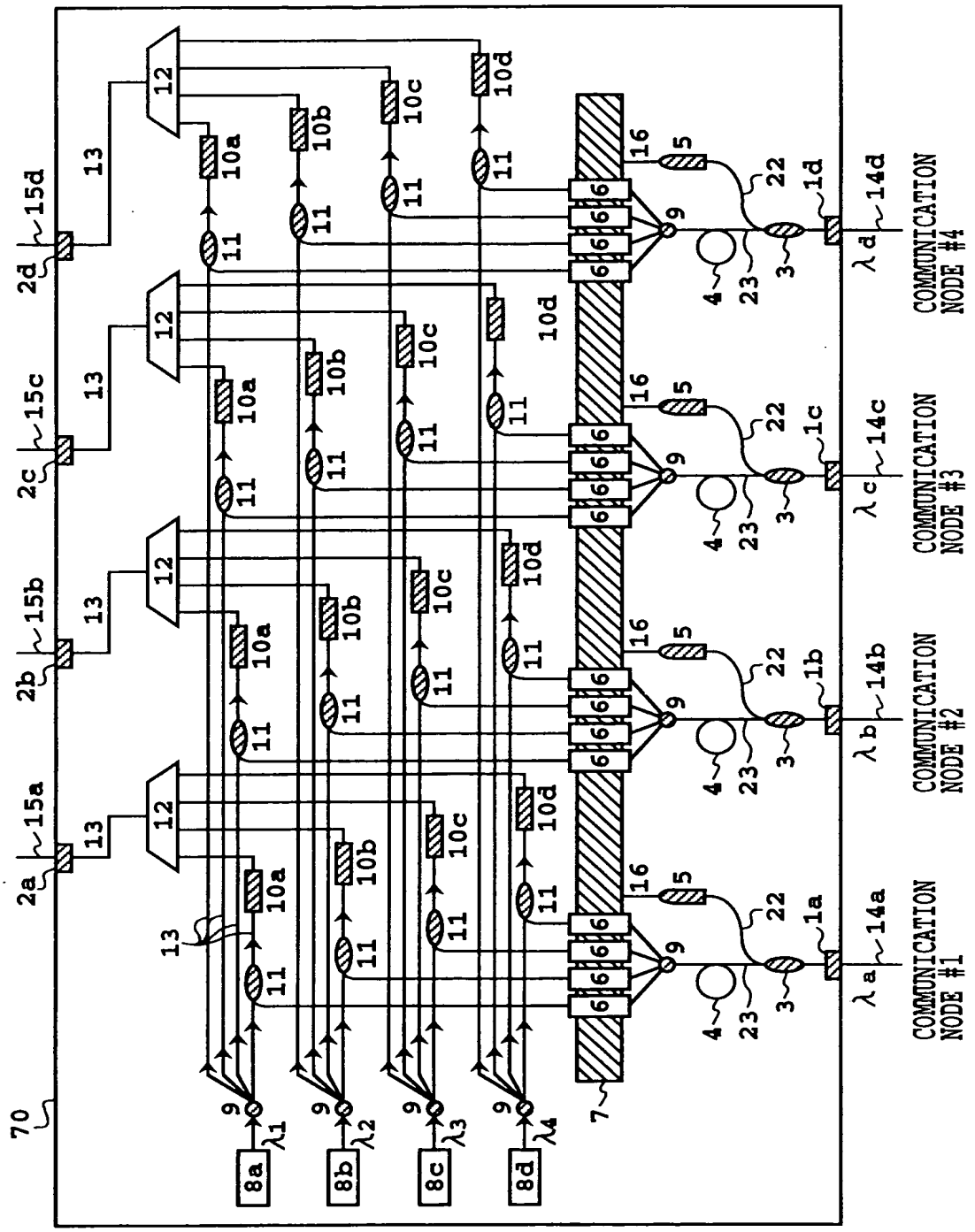
70
2a
2b
2c
2d
15a
15b
15c
15d
12
13
10a
10b
10c
10d
11
9
8a
8b
8c
8d
λ1
λ2
λ3
λ4
7
16
5
6
22
23
4
3
1a
1b
1c
1d
14a
14b
14c
14d
λa
λb
λc
λd
COMMUNICATION NODE #1
COMMUNICATION NODE #2
COMMUNICATION NODE #3
COMMUNICATION NODE #4

FIG.8

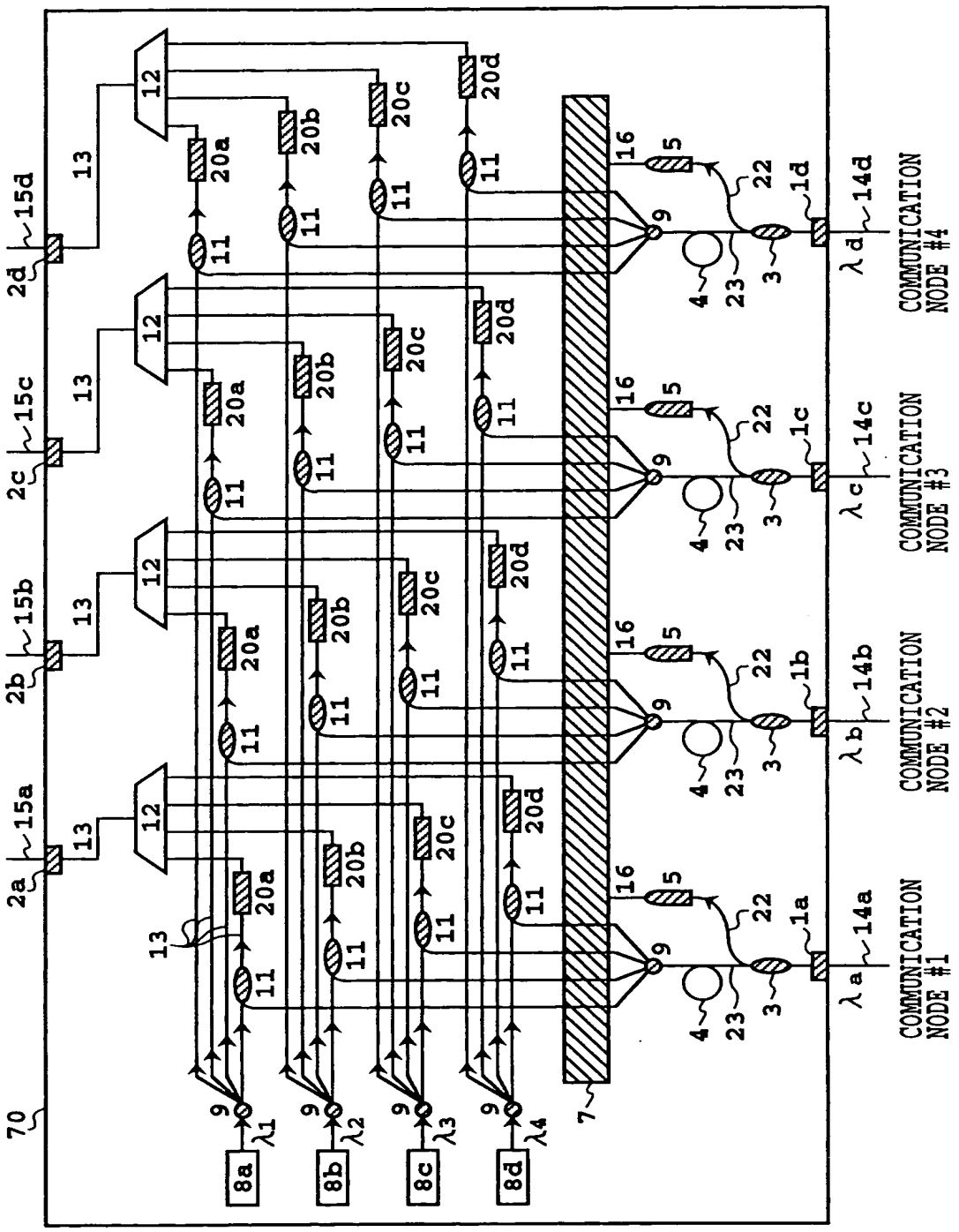
70
7
8a
8b
8c
8d
λ1
λ2
λ3
λ4
2a
2b
2c
2d
15a
15b
15c
15d
12
13
20a
20b
20c
20d
11
9
16
5
22
1a
1b
1c
1d
14a
14b
14c
14d
3
4
23
λ a
λ b
λ c
λ d
COMMUNICATION NODE #1
COMMUNICATION NODE #2
COMMUNICATION NODE #3
COMMUNICATION NODE #4

FIG.9

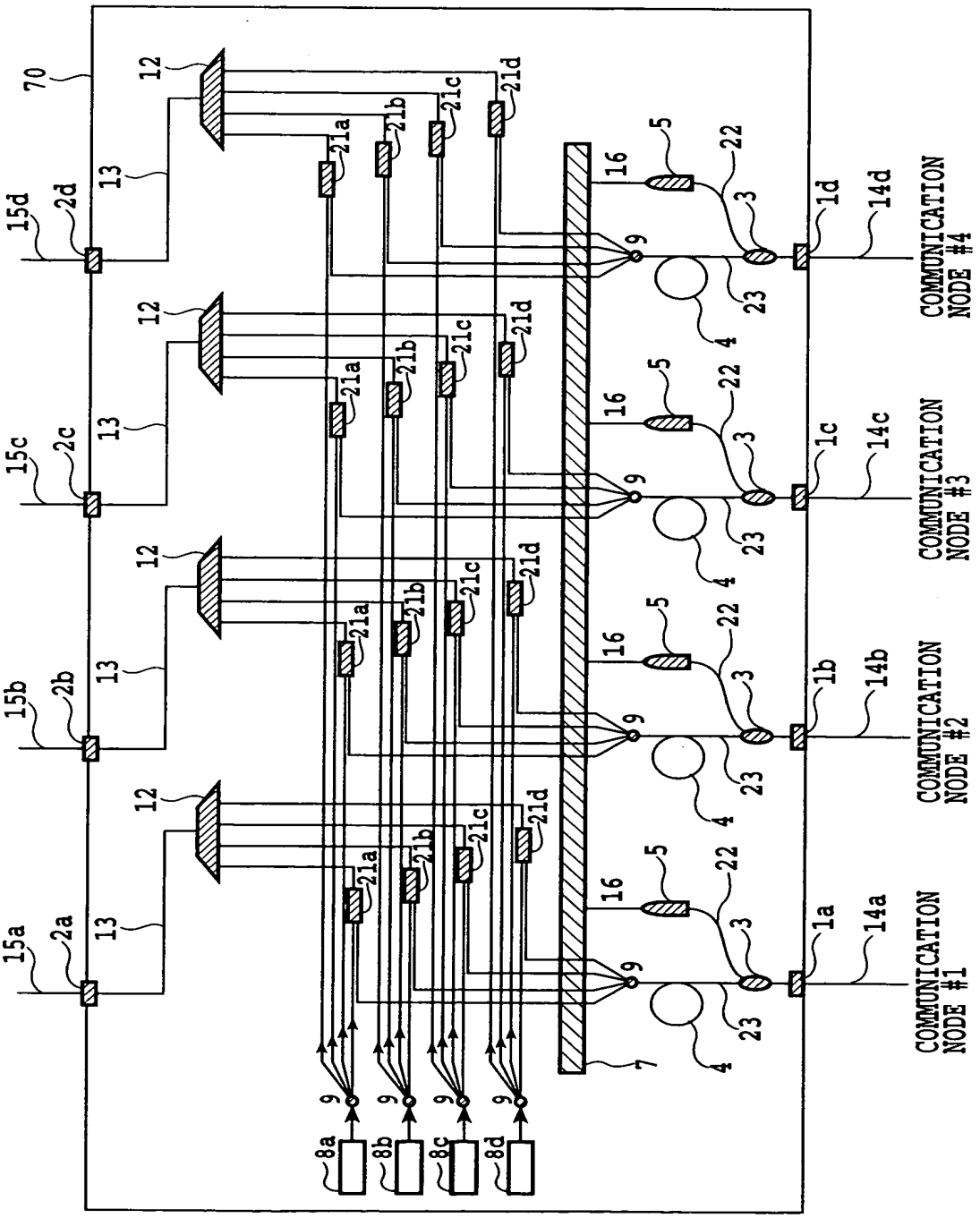
70
12
13
15d
2d
21a
21b
21c
21d
16
5
22
3
1d
14d
9
23
4
COMMUNICATION NODE #4
15c
2c
1c
14c
COMMUNICATION NODE #3
15b
2b
1b
14b
COMMUNICATION NODE #2
15a
2a
1a
14a
COMMUNICATION NODE #1
7
8a
8b
8c
8d

FIG.10

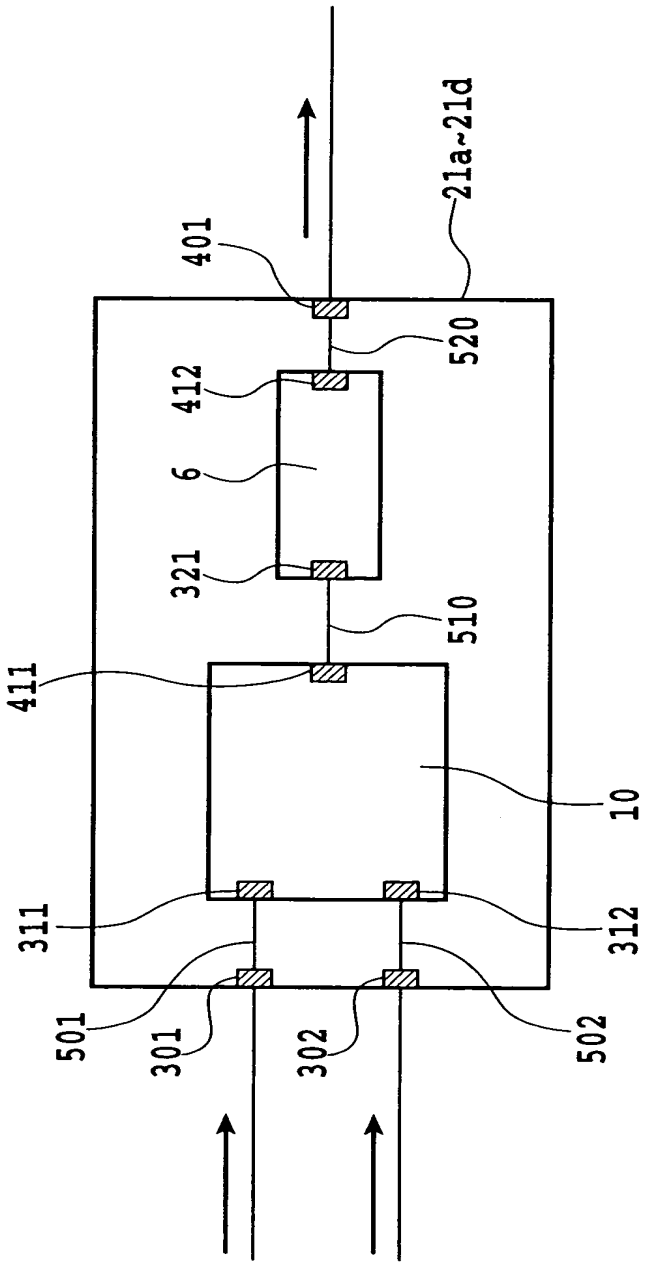

FIG.11

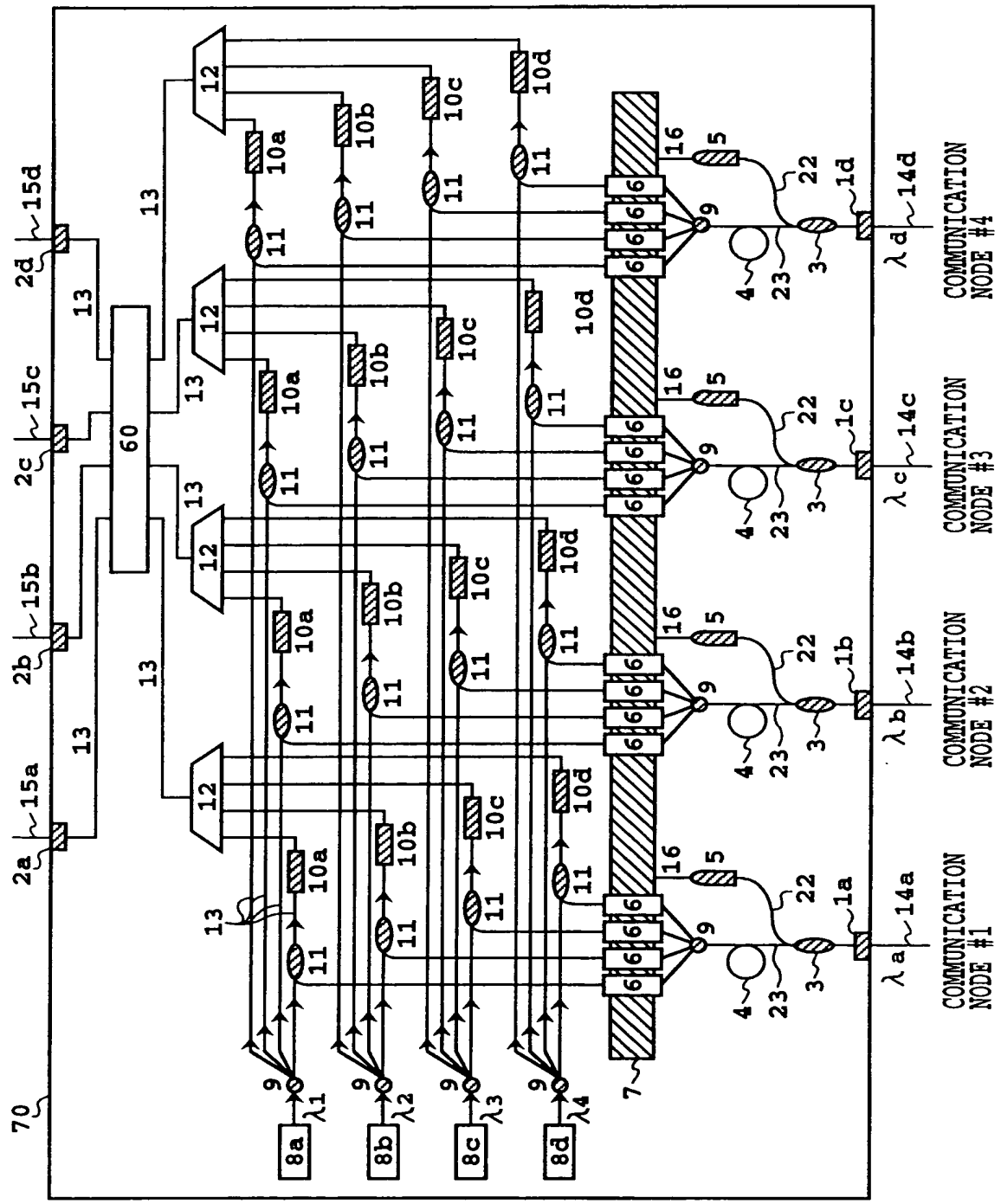
COMMUNICATION NODE #1
COMMUNICATION NODE #2
COMMUNICATION NODE #3
COMMUNICATION NODE #4
60
70
λ1
λ2
λ3
λ4
λa
λb
λc
λd

FIG.12

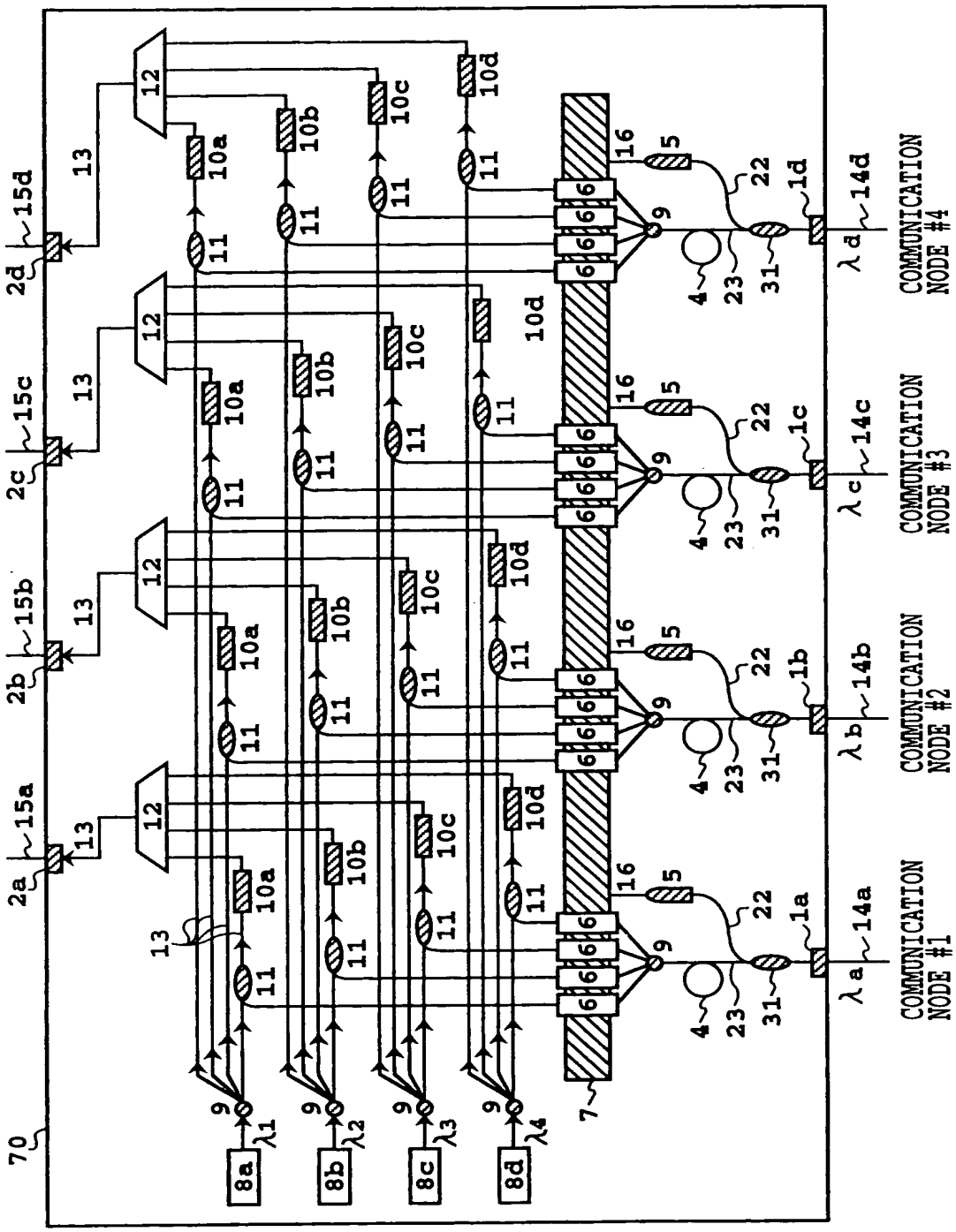
COMMUNICATION NODE #1
COMMUNICATION NODE #2
COMMUNICATION NODE #3
COMMUNICATION NODE #4
70
7
8a
8b
8c
8d
λ1
λ2
λ3
λ4
λa
λb
λc
λd
2a
2b
2c
2d
15a
15b
15c
15d
1a
1b
1c
1d
4
5
9
10a
10b
10c
10d
11
12
13
14a
14b
14c
14d
16
22
23
31

FIG.13

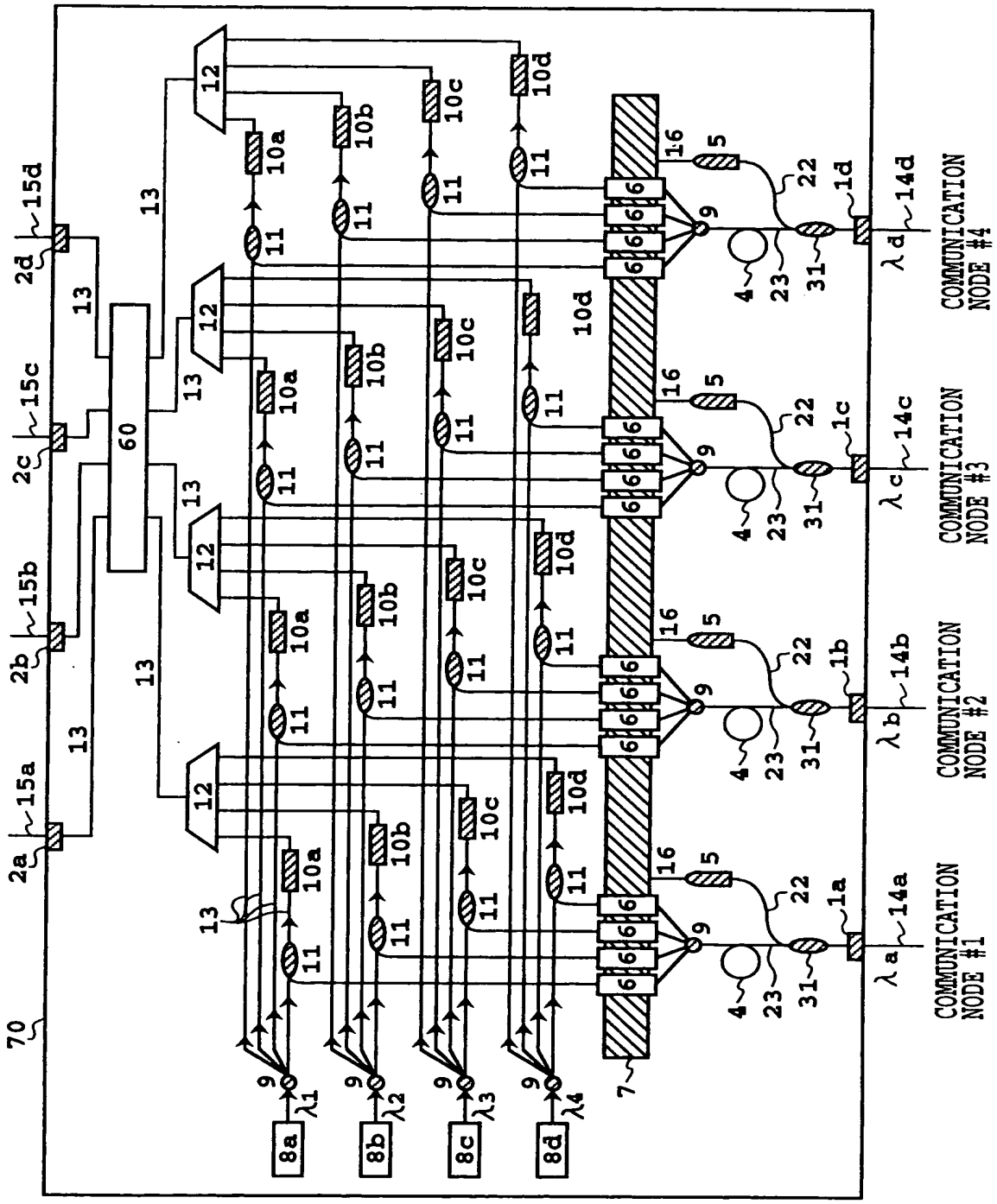
COMMUNICATION NODE #1
COMMUNICATION NODE #2
COMMUNICATION NODE #3
COMMUNICATION NODE #4
λ1
λ2
λ3
λ4
λa
λb
λc
λd
60
70

FIG.14

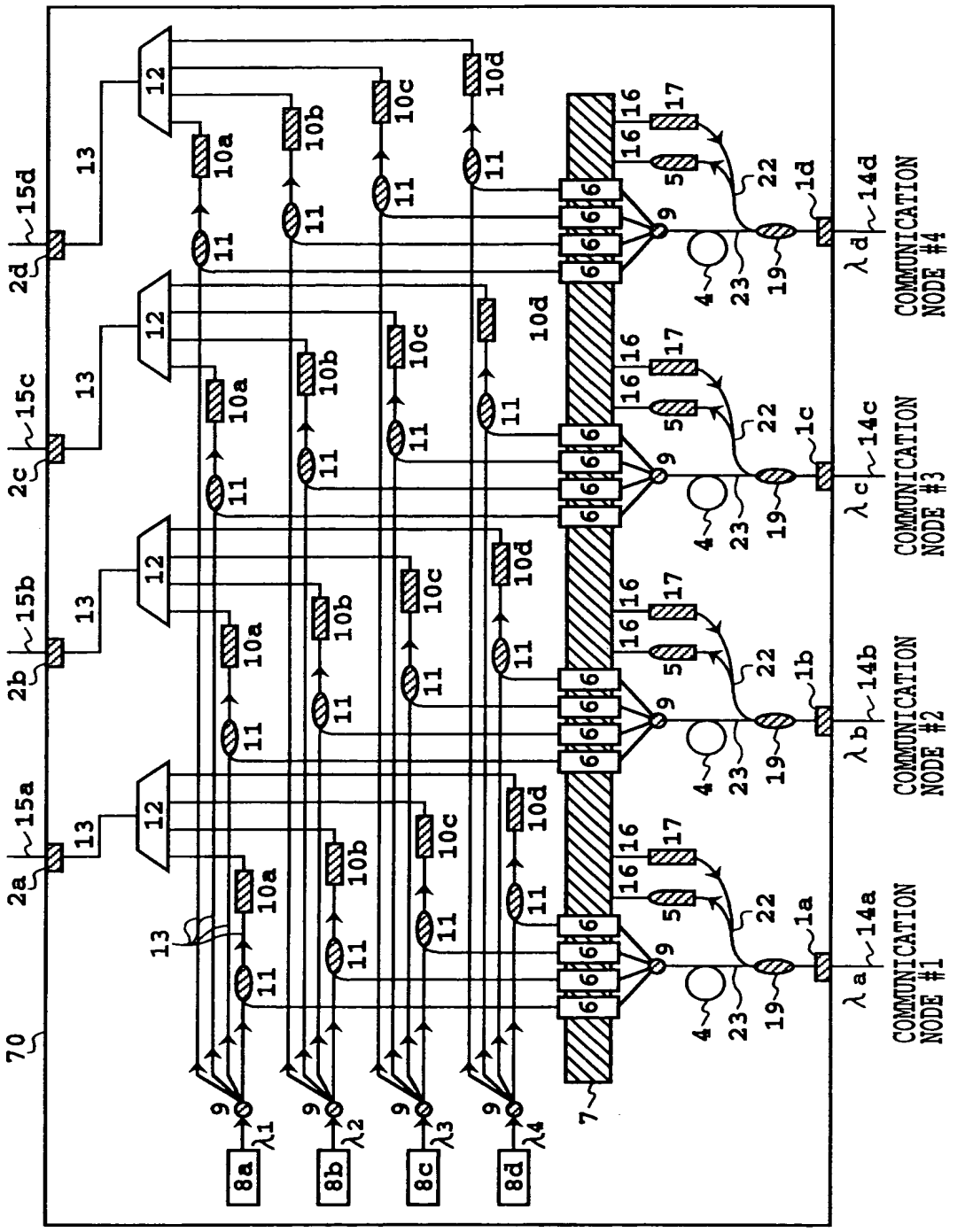
COMMUNICATION NODE #1
COMMUNICATION NODE #2
COMMUNICATION NODE #3
COMMUNICATION NODE #4

FIG.15

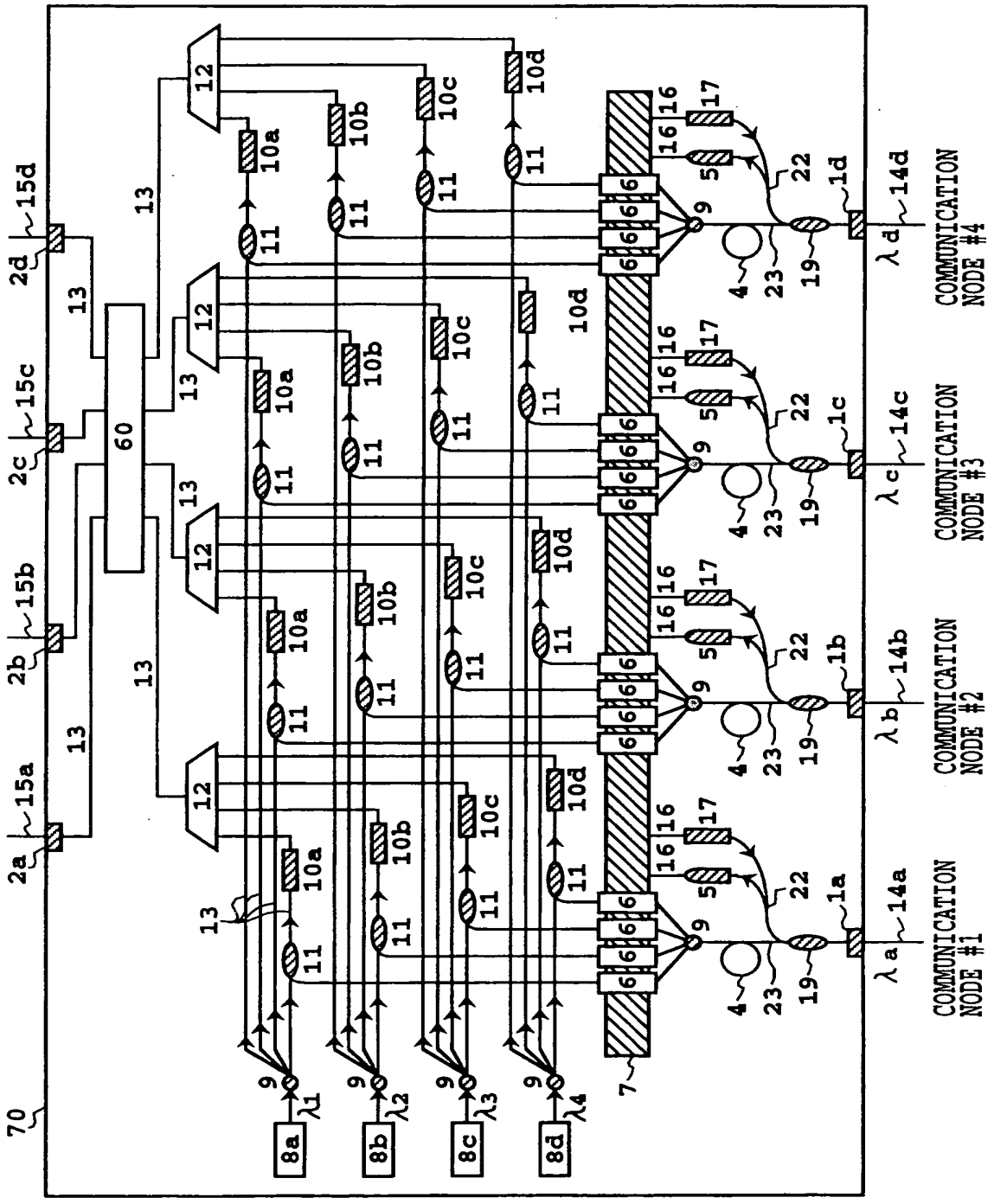
COMMUNICATION NODE #1
COMMUNICATION NODE #2
COMMUNICATION NODE #3
COMMUNICATION NODE #4
60
70

FIG.16

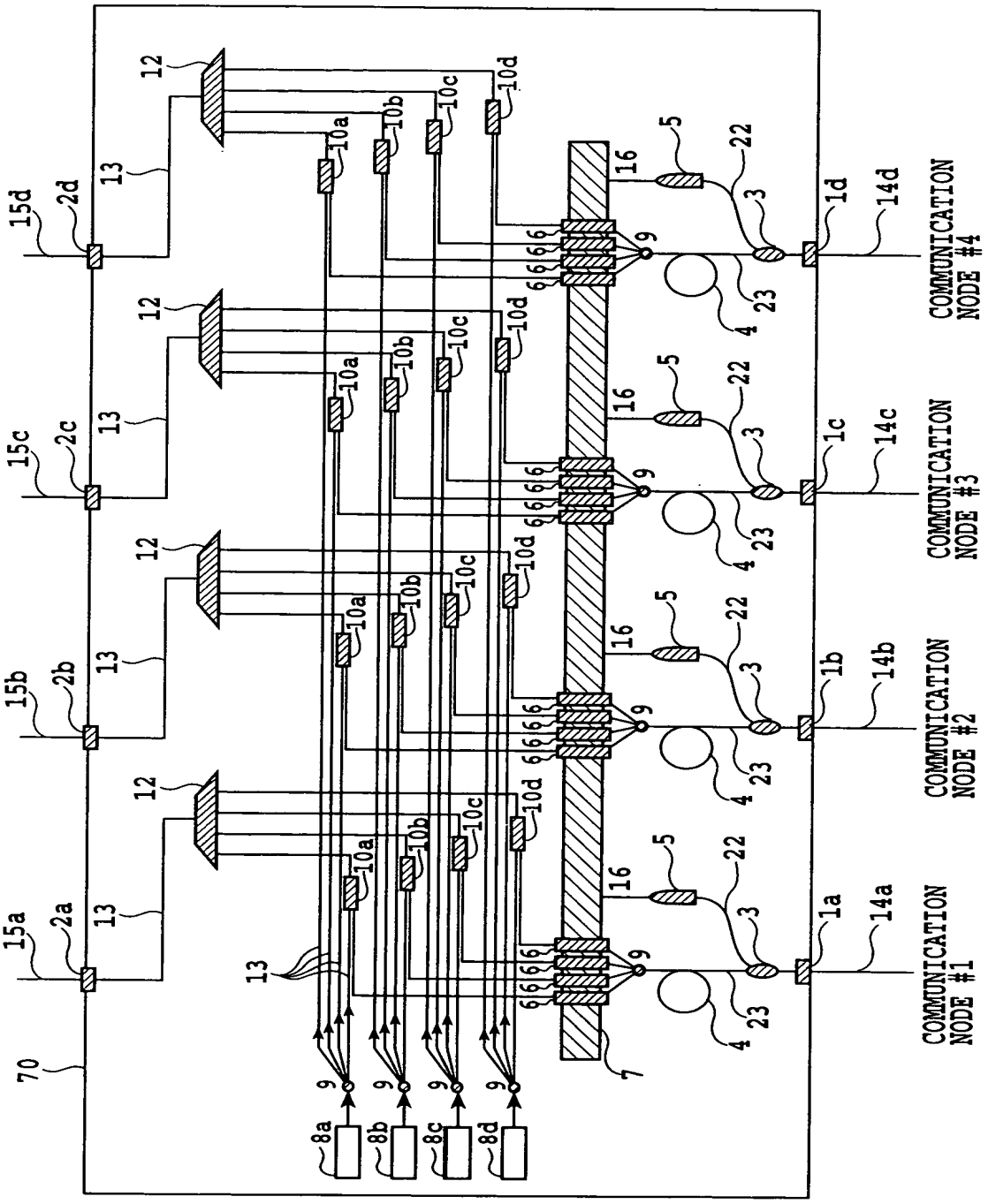
COMMUNICATION NODE #1
COMMUNICATION NODE #2
COMMUNICATION NODE #3
COMMUNICATION NODE #4

FIG.17

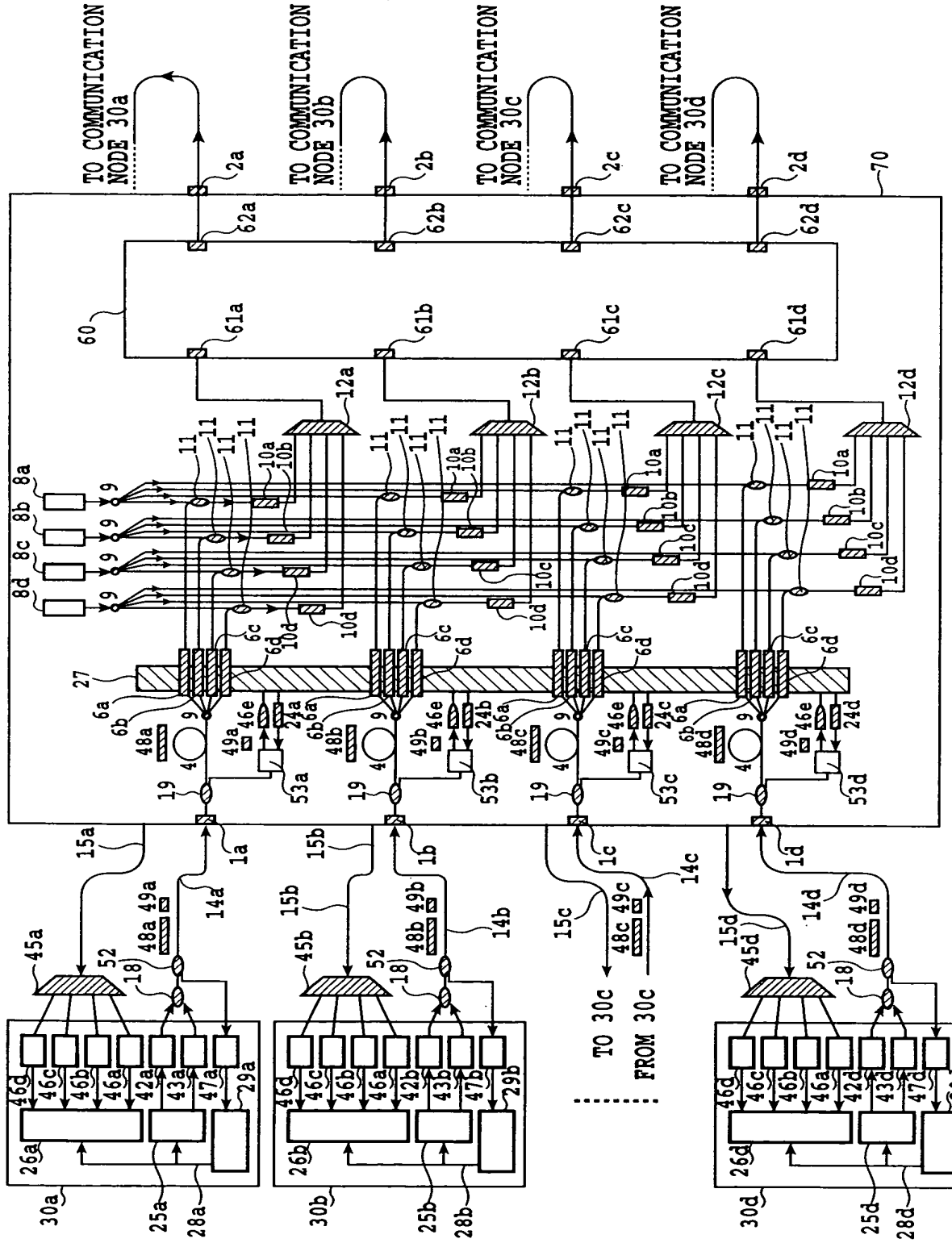
TO COMMUNICATION NODE 30a
TO COMMUNICATION NODE 30b
TO COMMUNICATION NODE 30c
TO COMMUNICATION NODE 30d
TO 30c
FROM 30c

FIG.18

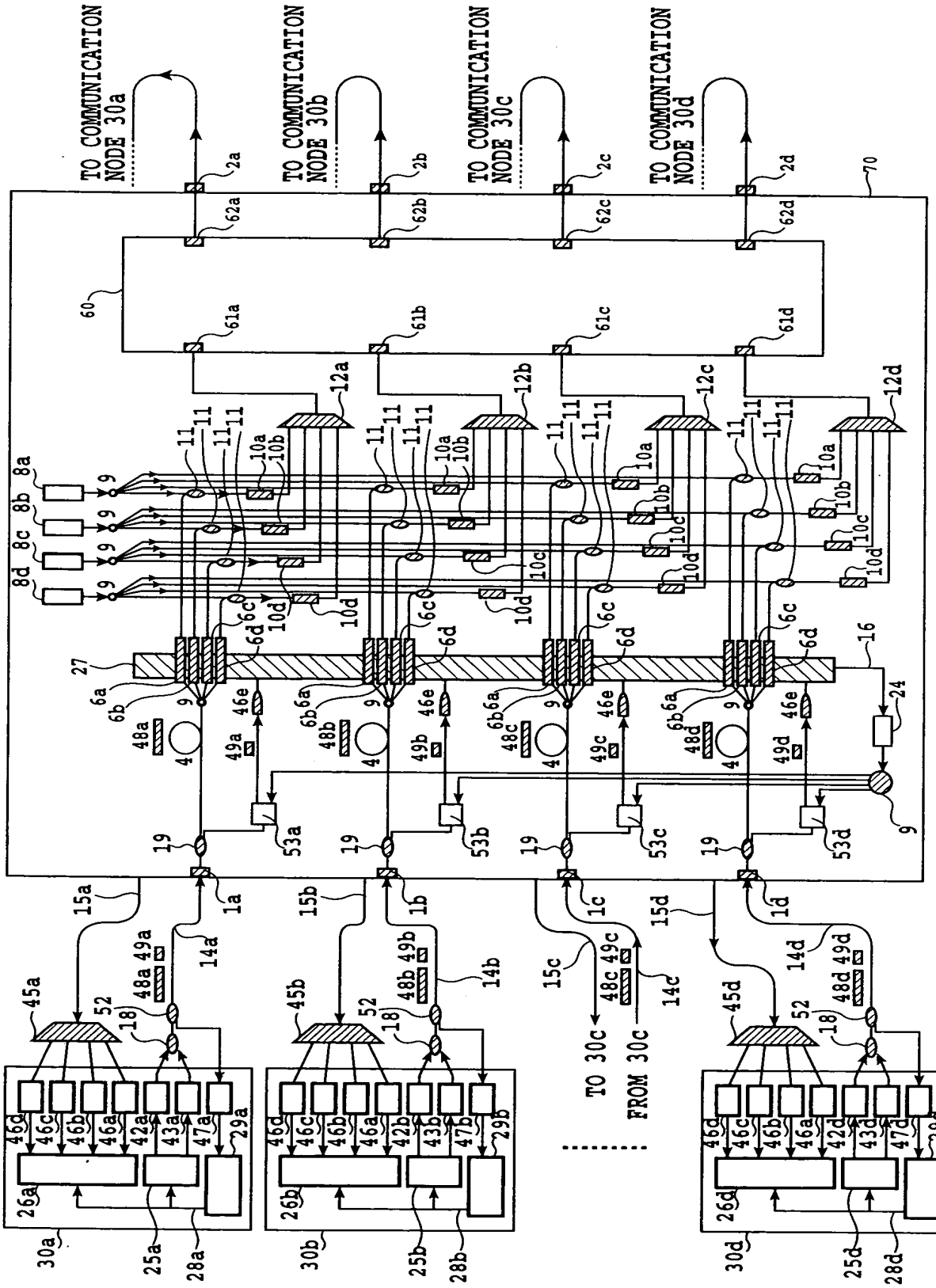
TO COMMUNICATION NODE 30a
TO COMMUNICATION NODE 30b
TO COMMUNICATION NODE 30c
TO COMMUNICATION NODE 30d
TO 30c
FROM 30c

FIG.19

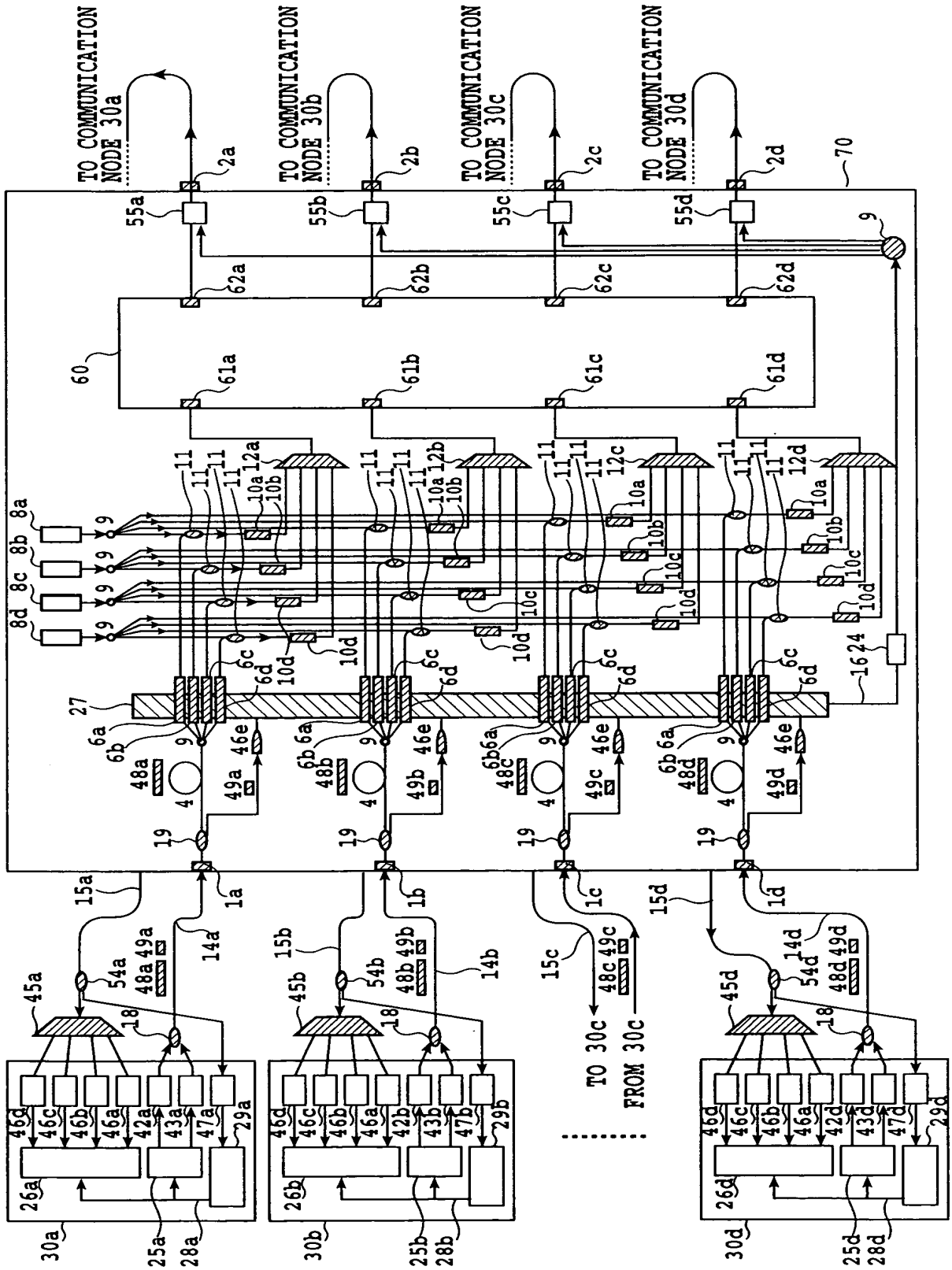
TO COMMUNICATION NODE 30a
TO COMMUNICATION NODE 30b
TO COMMUNICATION NODE 30c
TO COMMUNICATION NODE 30d
TO 30c
FROM 30c

FIG.20

		OUTPUT PORT			
		62a	62b	62c	62d
INPUT PORT	61a	λa	λb	λc	λd
	61b	λb	λc	λd	λa
	61c	λc	λd	λa	λb
	61d	λd	λa	λb	λc

FIG.21

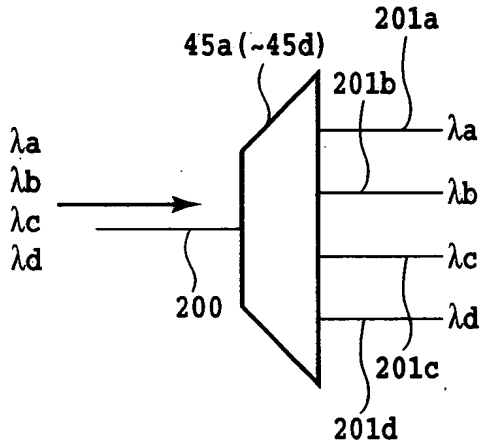

FIG.22

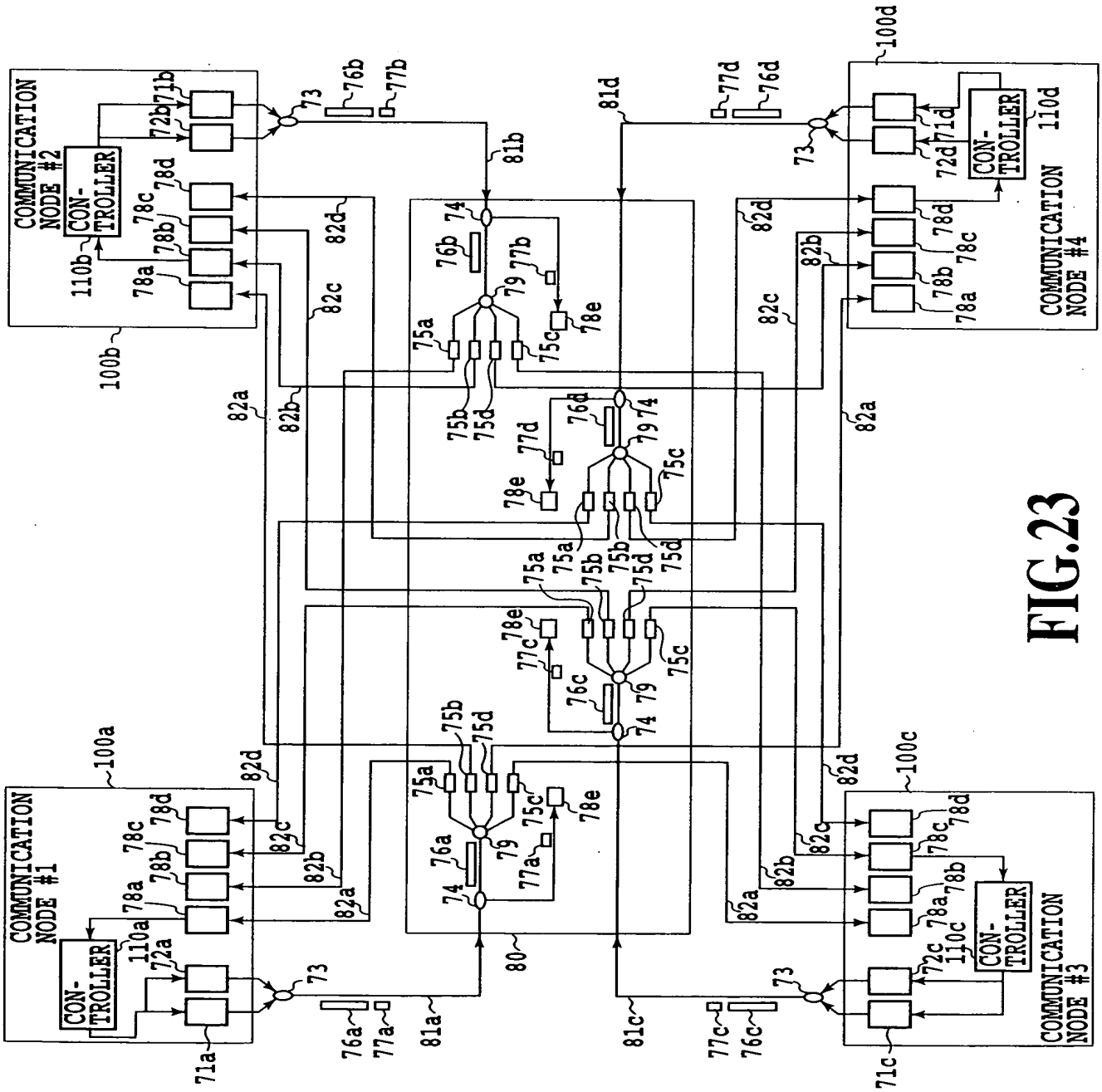
COMMUNICATION NODE #1
COMMUNICATION NODE #2
COMMUNICATION NODE #3
COMMUNICATION NODE #4
CON-TROLLER
100a
100b
100c
100d
110a
110b
110c
110d
80
71a
71b
71c
71d
72a
72b
72c
72d
73
74
75a
75b
75c
75d
76a
76b
76c
76d
77a
77b
77c
77d
78a
78b
78c
78d
78e
79
81a
81b
81c
81d
82a
82b
82c
82d

FIG.23

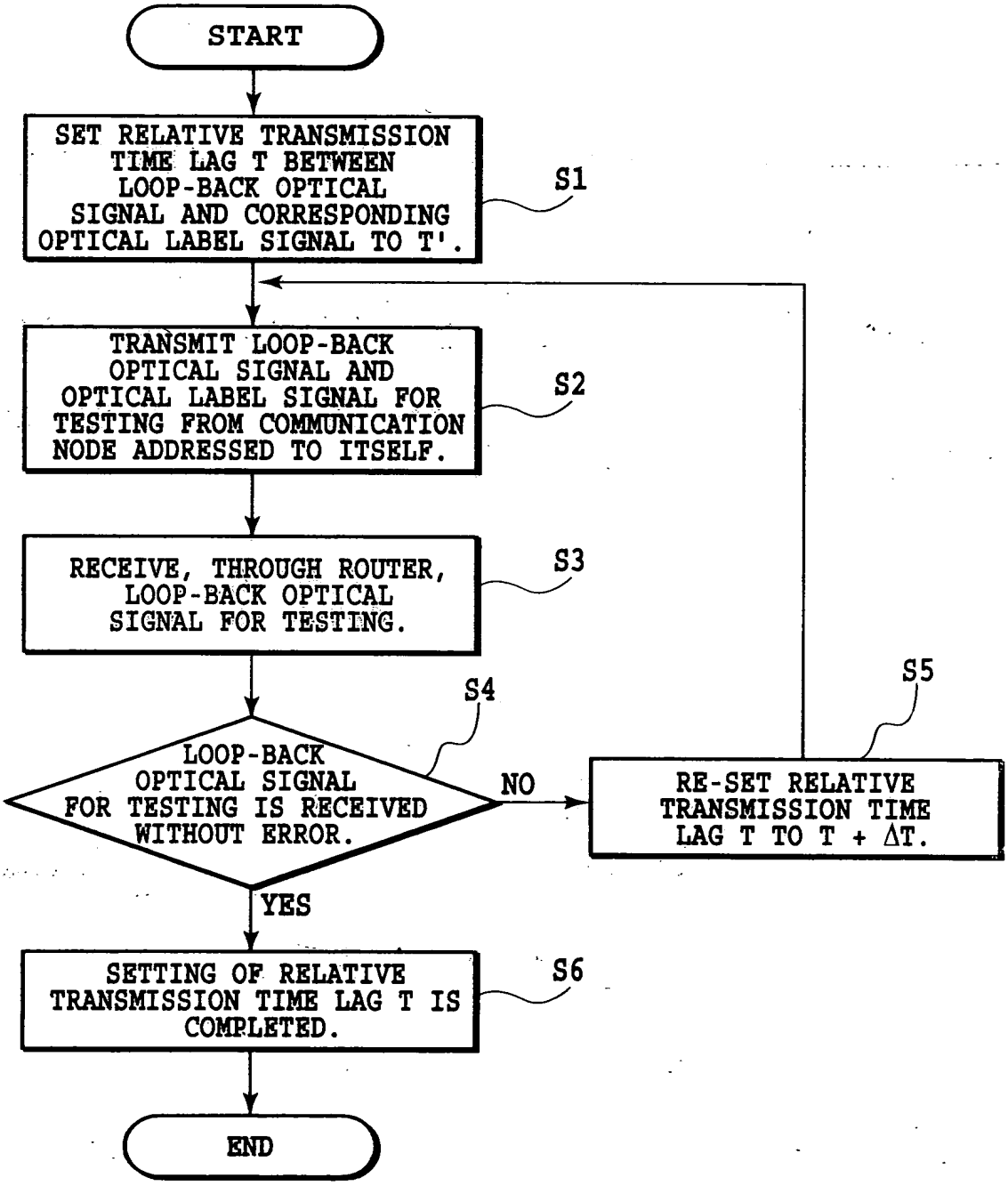
START
SET RELATIVE TRANSMISSION TIME LAG T BETWEEN LOOP-BACK OPTICAL SIGNAL AND CORRESPONDING OPTICAL LABEL SIGNAL TO T'.
S1
TRANSMIT LOOP-BACK OPTICAL SIGNAL AND OPTICAL LABEL SIGNAL FOR TESTING FROM COMMUNICATION NODE ADDRESSED TO ITSELF.
S2
RECEIVE, THROUGH ROUTER, LOOP-BACK OPTICAL SIGNAL FOR TESTING.
S3
S4
LOOP-BACK OPTICAL SIGNAL FOR TESTING IS RECEIVED WITHOUT ERROR.
NO
S5
RE-SET RELATIVE TRANSMISSION TIME LAG T TO T + ΔT.
YES
SETTING OF RELATIVE TRANSMISSION TIME LAG T IS COMPLETED.
S6
END

FIG.24

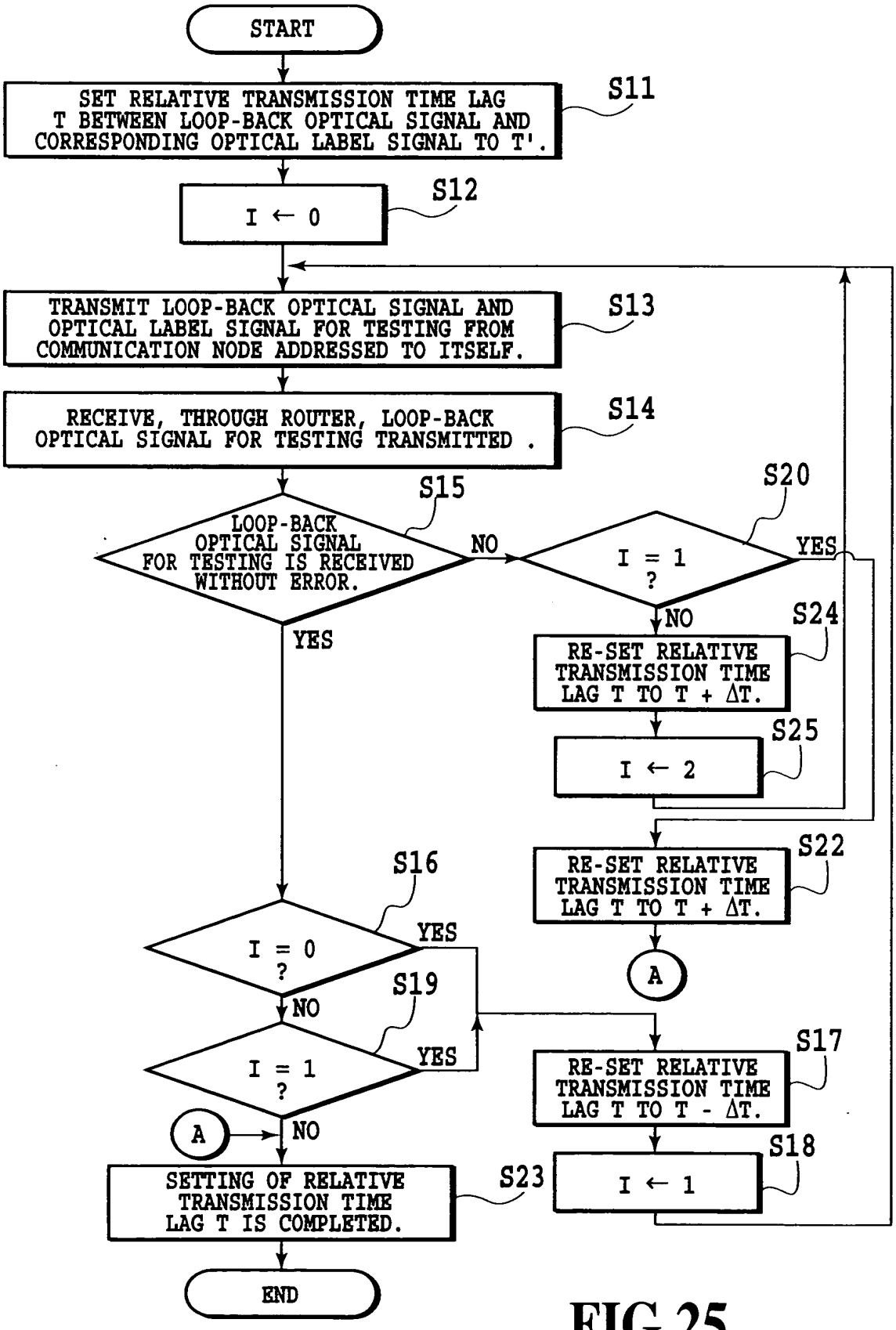
START
SET RELATIVE TRANSMISSION TIME LAG T BETWEEN LOOP-BACK OPTICAL SIGNAL AND CORRESPONDING OPTICAL LABEL SIGNAL TO T'.
S11
I ← 0
S12
TRANSMIT LOOP-BACK OPTICAL SIGNAL AND OPTICAL LABEL SIGNAL FOR TESTING FROM COMMUNICATION NODE ADDRESSED TO ITSELF.
S13
RECEIVE, THROUGH ROUTER, LOOP-BACK OPTICAL SIGNAL FOR TESTING TRANSMITTED .
S14
LOOP-BACK OPTICAL SIGNAL FOR TESTING IS RECEIVED WITHOUT ERROR.
S15
NO
YES
I = 1 ?
S20
YES
NO
RE-SET RELATIVE TRANSMISSION TIME LAG T TO T + ΔT.
S24
I ← 2
S25
RE-SET RELATIVE TRANSMISSION TIME LAG T TO T + ΔT.
S22
A
I = 0 ?
S16
YES
NO
I = 1 ?
S19
YES
RE-SET RELATIVE TRANSMISSION TIME LAG T TO T - ΔT.
S17
I ← 1
S18
A
NO
SETTING OF RELATIVE TRANSMISSION TIME LAG T IS COMPLETED.
S23
END

FIG.25

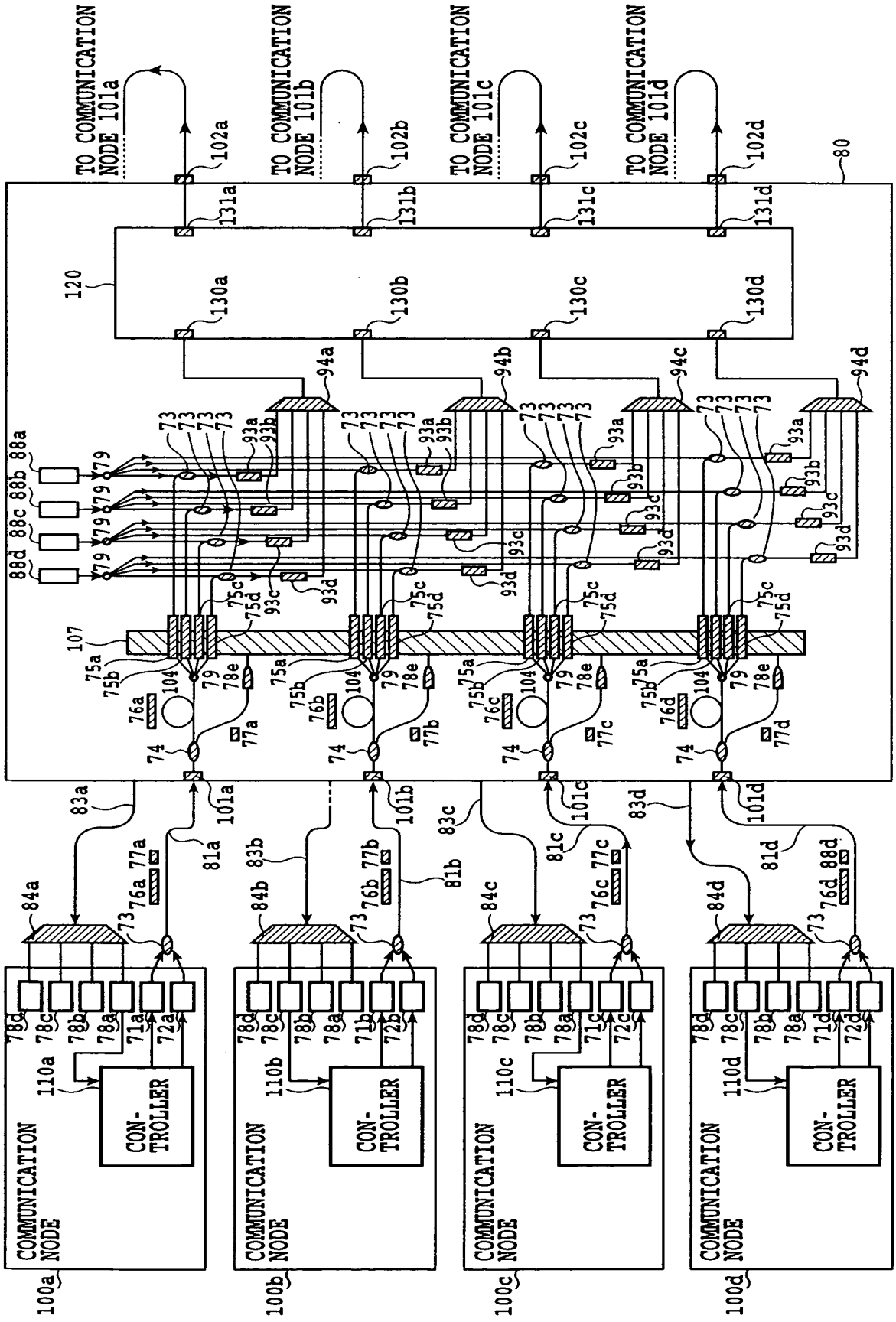
TO COMMUNICATION NODE 101a
TO COMMUNICATION NODE 101b
TO COMMUNICATION NODE 101c
TO COMMUNICATION NODE 101d
102a
102b
102c
102d
80
120
130a
130b
130c
130d
131a
131b
131c
131d
94a
94b
94c
94d
107
104
79
73
74
75a
75b
75c
75d
76a
76b
76c
76d
77a
77b
77c
78a
78b
78c
78d
78e
81a
81b
81c
81d
83a
83b
83c
83d
84a
84b
84c
84d
88a
88b
88c
88d
93a
93b
93c
93d
101a
101b
101c
101d
110a
110b
110c
110d
CON-TROLLER
COMMUNICATION NODE
100a
100b
100c
100d

FIG.26

		OUTPUT PORT			
		131a	131b	131c	131d
INPUT PORT	130a	λa	λb	λc	λd
	130b	λb	λc	λd	λa
	130c	λc	λd	λa	λb
	130d	λd	λa	λb	λc

FIG.27

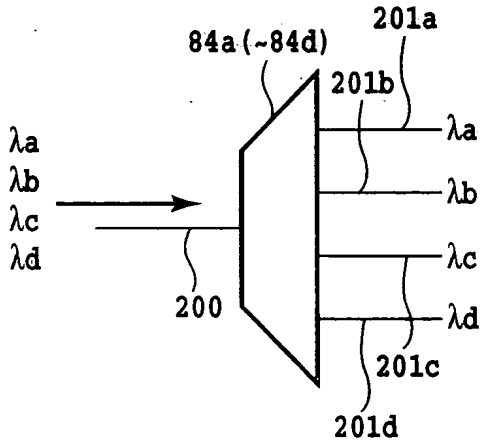

FIG.28